

## CLAIMS

What is claimed is:

1. A method of managing the transmission of data traffic from a plurality of queues, comprising:

maintaining a regular credit count and a history credit count for each of the queues;

periodically polling the history credit counts of the queues to identify candidates for arbitration, a queue being identified as a candidate if data transmission from the queue is not blocked and the queue has a history credit count greater than a first predetermined minimum value;

both periodically and upon identifying no candidates for arbitration by polling the history credit counts, polling the regular credit counts of the queues to identify candidates for arbitration, a queue being identified as a candidate if data transmission from the queue is not blocked and the queue has a regular credit count greater than a second predetermined minimum value;

upon identifying candidates for arbitration based on either the history or regular credit counts, performing arbitration among those queues identified as candidates;

periodically increasing the regular credit count or history credit count of each queue, the regular credit count for a queue being increased when data transmission from the queue is not blocked, the history credit count for a queue being increased when data transmission from the queue is blocked; and

decreasing either the regular credit count or history credit count for each queue when data is transmitted from the queue upon winning an arbitration, the history credit count being decreased when the arbitration has been won on the basis of the history

29 credit count, and the regular credit count being decreased when  
30 arbitration has been won on the basis of the regular credit count.

1 2. A method according to claim 1, further comprising:

2 maintaining a shift register containing a pattern  
3 establishing the relative frequencies at which the regular credit  
4 count and the history credit count are polled;

5 periodically shifting the contents of the shift register;

6 and

7 upon each shift of the shift register, determining based on  
8 the value of the binary digit at a predetermined position in the  
9 shift register whether to poll the history credit count or the  
10 regular credit count.

1 3. A method according to claim 1, wherein data transmission from  
2 the queue is determined to be blocked when the queue is either  
3 empty or is facing backpressure, and data transmission from the  
4 queue is determined not to be blocked when the queue is non-empty  
5 and is not facing backpressure.

1 4. A method according to claim 1, wherein the increasing of the  
2 regular credit count and history credit count of each queue occurs  
3 upon identifying no candidates during the polling of the regular  
4 credit count.

1 5. A method according to claim 1, wherein performing arbitration  
2 comprises performing round-robin arbitration.

1 6. A method according to claim 1, wherein the first predetermined  
2 minimum value is zero.

1 7. A method according to claim 1, wherein the second predetermined  
2 minimum value is zero.

1 8. A method according to claim 1, further comprising maintaining a  
2 history credit limit for each of the queues, and wherein the  
3 history credit count for each queue is increased when data  
4 transmission from the queue is blocked and the history credit  
5 count is less than the history credit limit.

1 9. A method according to claim 1, further comprising maintaining a  
2 weight for each queue, and wherein the increasing of the history  
3 credit count and the regular credit count of each queue comprise  
4 increasing the credit count by the corresponding weight.

1 10. A method according to claim 9, wherein the weights maintained  
2 for the different queues are generally different.

1 11. A method according to claim 1, wherein each queue corresponds  
2 to a different output of a network device.

1 12. A method according to claim 1, further comprising  
2 re-polling the regular credit count of each queue upon  
3 increasing the regular credit count and history credit count of  
4 each queue; and  
5 upon identifying candidates for arbitration based on the  
6 re-polling of the regular credit counts, performing arbitration  
7 among those queues identified as candidates.

1 13. A method according to claim 12, further comprising repeating  
2 the increasing of the credit counts, the re-polling, and the  
3 conditional performing of arbitration among candidates identified  
4 based on the re-polling up to a predetermined maximum number of  
5 times.

1 14. A method according to claim 1, further comprising:  
2 polling the respective lengths of the queues if no  
3 candidates are identified upon the polling of the regular credit  
4 counts; and  
5 upon identifying candidates for arbitration based on the  
6 polling of the queue lengths, performing arbitration among those  
7 queues identified as candidates.

1 15. A method according to claim 1, further comprising:  
2 polling the queues to identify those queues containing data,  
3 if no candidates are identified upon the polling of the regular  
4 credit counts; and  
5 upon identifying candidates for arbitration based on  
6 identifying queues containing data, performing arbitration among  
7 those queues identified as candidates.

1 16. A network switch, comprising:  
2 a plurality of queues, each queue receiving data from an  
3 input of the switch and being associated with a corresponding  
4 different output of the switch, each queue including a  
5 corresponding regular credit count and history credit count;  
6 data transfer logic operative to transfer data from a  
7 selected one of the queues to the corresponding output of the  
8 switch; and

9 arbitration logic operative to:

10 (1) periodically poll the history credit counts of the  
11 queues to identify candidates for arbitration, a queue being  
12 identified as a candidate if data transmission from the  
13 queue is not blocked and the queue has a history credit  
14 count greater than a first predetermined minimum value;

15 (2) both periodically and upon identifying no  
16 candidates for arbitration by polling the history credit  
17 counts, poll the regular credit counts of the queues to

18 identify candidates for arbitration, a queue being  
19 identified as a candidate if data transmission from the  
20 queue is not blocked and the queue has a regular credit  
21 count greater than a second predetermined minimum value;

22 (3) upon identifying candidates for arbitration based  
23 on either the history or regular credit counts, perform  
24 arbitration among those queues identified as candidates;

25 (4) periodically increase either the regular credit  
26 count or history credit count of each queue, the regular  
27 credit count for a queue being increased when data  
28 transmission from the queue is not blocked, the history  
29 credit count for a queue being increased when data  
30 transmission from the queue is blocked; and

31 (5) decrease either the regular credit count or history  
32 credit count for each queue when data is transmitted from  
33 the queue upon winning an arbitration, the history credit  
34 count being decreased when the arbitration is won on the  
35 basis of the history credit count, and the regular credit  
36 count being decreased when arbitration is won on the basis  
37 of the regular credit count.